Capacity Management, Operations and Maintenance (CMOM) Program Document

Prepared for

Lynn Water and Sewer Commission

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CH2MHILL®

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Preventive Maintenance Coordinator	TBD
Fat, Oil, and Grease (FOG)	TBD
Management Information System (MIS)	TBD

Acronyms and Abbreviations

AOC	Administrative Order on Consent
BMP	best management practice
CCTV	closed-circuit television
CIP	Capital Improvement Program
CM	corrective maintenance
CMMS	computerized maintenance management system
CMOM	Capacity Management, Operations, and Maintenance
Commission	Lynn Water and Sewer Commission
CSO	combined sewer overflow
CSS	combined sewer system
FOG	fat, oil, and grease
FSE	food service establishment
GIS	geographic information system
HR	Human Resources
ISD	Inspectional Services Department
IT	information technology
LTPMP	Long-Term Preventive Maintenance Plan
LWSC	Lynn Water and Sewer Commission
MassDEP	Massachusetts Department of Environmental Protection
MIS	management information system
MSDS	material safety data sheet
NEWEA	New England Water Environment Association
O&M	operation and maintenance
PdM	predictive maintenance
PM	preventive maintenance
RCFA	Root Cause Failure Analysis
SOP	standard operating procedure
SSO ERP	Sanitary Sewer Overflow Emergency Response Plan
SSO	sanitary sewer overflow
USEPA	U.S. Environmental Protection Agency

SECTION 1

Capacity Management, Operations, and Maintenance (CMOM) Overview

1.1 CMOM Program Overview

The U.S. Environmental Protection Agency (USEPA) developed the Capacity Management, Operations, and Maintenance (CMOM) Program to assess the overall performance of a utilities collection system. It includes, but is not limited to, the evaluation of operations, maintenance, emergency response, collection system performance, communications, financial, and capital planning. The USEPA believes that every sewer utility has the potential to have a collection system failure resulting from blockages, insufficient capacity, structural, or mechanical failures (USEPA, 2005). The intention of CMOM is to establish a set of best management practices (BMPs) as well as standard operation and maintenance practices to provide the highest level of customer service while minimizing regulatory non-compliance.

A priority of any CMOM program is to maximize the performance and reliability of collection system performance while minimizing sanitary sewer overflows (SSOs). Reduction of SSOs is not a singular process relegated to a single department. Rather, it takes the coordination and understanding of the entire Lynn Water and Sewer Commission (Commission) working in unison with standard policies and procedures that support the CMOM mission.

A priority of any CMOM program is to maximize the performance and reliability of collection system performance while minimizing sanitary sewer overflows (SSOs). Reduction of SSOs is not a singular process relegated to a single department.

The Commission's specific CMOM Program purpose is to provide for the proper operation and maintenance (O&M) of its assets while minimizing failures, malfunctions, and line blockages that could contribute to SSOs and combined sewer system (CSS) releases. This document summarizes the practices that are currently in place and in development by the Commission to support its CMOM processes. These practices represent the preventive, corrective, and capital planning activities which will continue to be developed and standardized to support the refinement of the Commission's CMOM Program. The following list summarizes the specific goals of the Commission's CMOM Program and a graphic representation of its goals is included in Figure 1-1.

- To streamline the reporting of SSO events for the capture of all relevant event information, improvement in reporting times, and the support of detailed field investigations.
- To adjust the organizational structure to support CMOM efforts, including:
  - To manage the additional field staffing or contracted labor related to the expansion of the preventive maintenance (PM) program.
  - To modify the roles and responsibilities in departments related to SSO response and report management of field data from the increase in PM activities.
  - To coordinate among departments of risk-based capital reinvestment decisions using a common platform.
- To develop a Fat, Oil, and Grease (FOG) Program with detailed recommendations about BMPs that could apply to Commission efforts. FOG has been identified as a contributor to dry weather SSO events.
- To implement a management information system (MIS) and update to include a computerized maintenance management system (CMMS) implementation and geographic information system (GIS)

updating. The systems will work to improve data management and meet the expectations of future reporting requirements.

- To improve Capital Improvement Program (CIP) planning to capture and prioritize high risk assets in need of repair or replacement, such as pipes that have sagged or collapsed.

FIGURE 1-1
CMOM Goals

1.2 CMOM Program Document Objective

The CMOM Program document is intended to be used as a reference manual summarizing the maintenance, management, and operational activities the Commission is using to support its CMOM Program. The activities detailed in this document are described as individual processes and are summarized by activity objective, description of the associated process, roles and ownership, responsibilities, and reporting metrics.

Some activities also have standard operating procedures (SOPs) and/or detailed program manuals which will be referenced for their location. These documents will be available to both existing and newly hired staff as a resource to educate individuals on the Commission's O&M strategies and CMOM Program. Therefore, this document will be continually updated to reflect the current status of the standards, procedures, and operations used by the Commission to sustain its goals. The integrity of the document will be maintained by the CMOM Program Director.

The topics within this program document are broken down into the five categories shown in Table 1-1.

TABLE 1-1
CMOM Program Document Topics

Activity	CMOM Relevance	Summary
Organizational Alignment	Departmental Support	Summary of the organizational hierarchy that supports CMOM
Sanitary Sewer Overflow Response	Emergency Response	Summary of the policies and procedures in place to address SSO response
Fat, Oil, and Grease (FOG) Program	Capacity Assurance	Summary of the FOG Program
Maintenance Processes	Preventive Maintenance (PM) Corrective Maintenance (CM) Emergency Response Capacity Assurance	Description of Long-Term Preventive Maintenance Plan (LTPMP).
Capital Improvement Planning	Financial Planning O&M Planning	Summary of the capital planning process and how it relates to each of the departments in the Commission.

1.3 Implementation Schedule

The Commission began developing its CMOM Program strategy through the *CMOM Self-Assessment Report* (CH2M HILL, 2013a), the *CMOM Long-Term Preventive Maintenance Plan* (CH2M HILL, 2013b), which is included in this report as Appendix A, and the *CMOM Corrective Action Plan* (CH2M HILL, 2013c), which is included in this report as Appendix B. Since then, the Commission has continued to develop systems and processes to support its CMOM Program, and is following the implementation plan as described in detail in the *CMOM Corrective Action Plan* (CH2M HILL, 2013c) submitted to USEPA in September 2013. As CMOM-related activities, processes, and systems are adopted, modified, or eliminated, the CMOM Program document will be updated to reflect its current status. The CMOM Program Director is responsible for reviewing and editing this document at a minimum frequency of annually or when significant changes to an activity warrant a revision.

1.4 Information Library

In order for the document to be accessible to staff as well as regulating authorities, it will exist in both electronic and hard copy form. The hard copy document will be maintained under control of the CMOM Program Director in an area that is easily accessible to Commission staff and include a directory of where supporting information and documents may be found. The electronic version of the document will maintain a directory of file names that link directly to the supporting documents.

- Hard copies of the CMOM Program document will be located in a CMOM library located at the Commission offices under the control of the CMOM Director.
- Electronic files will be maintained in a CMOM Program electronic directory.

SECTION 2

Organizational Alignment

2.1 Objective

In order to facilitate the delivery of a successful Capacity Management, Operations, and Maintenance (CMOM) Program, appropriate management positions, field staff positions, and lines of communications are necessary. CMOM is not a program that is delivered by a single person or department. It takes a network of staff and coordination of department policies to ensure effective program delivery. The management positions must work to support the mission of the CMOM Program as well as support the training and development of the staff who deliver the program. Lines of communication, including CMOM activity standard operating procedures (SOPs) and chains of command, must be clearly defined and consistently followed to be effective.

2.2 Summary

The position specifically supporting the CMOM Program for the Commission is the CMOM Program Director. This position reports directly to the Chief Engineer. The CMOM Program Director position, new to the Commission in 2013, oversees, coordinates, and supports the efforts for the existing and developing CMOM roles and activities. The CMOM Program Director is responsible for the overall implementation and sustainability of the CMOM Program.

The CMOM Program Director is the owner of the SSO Response Program, FOG program, Preventive and Corrective Maintenance activities, and provides field input into the expanded Capital Planning process.

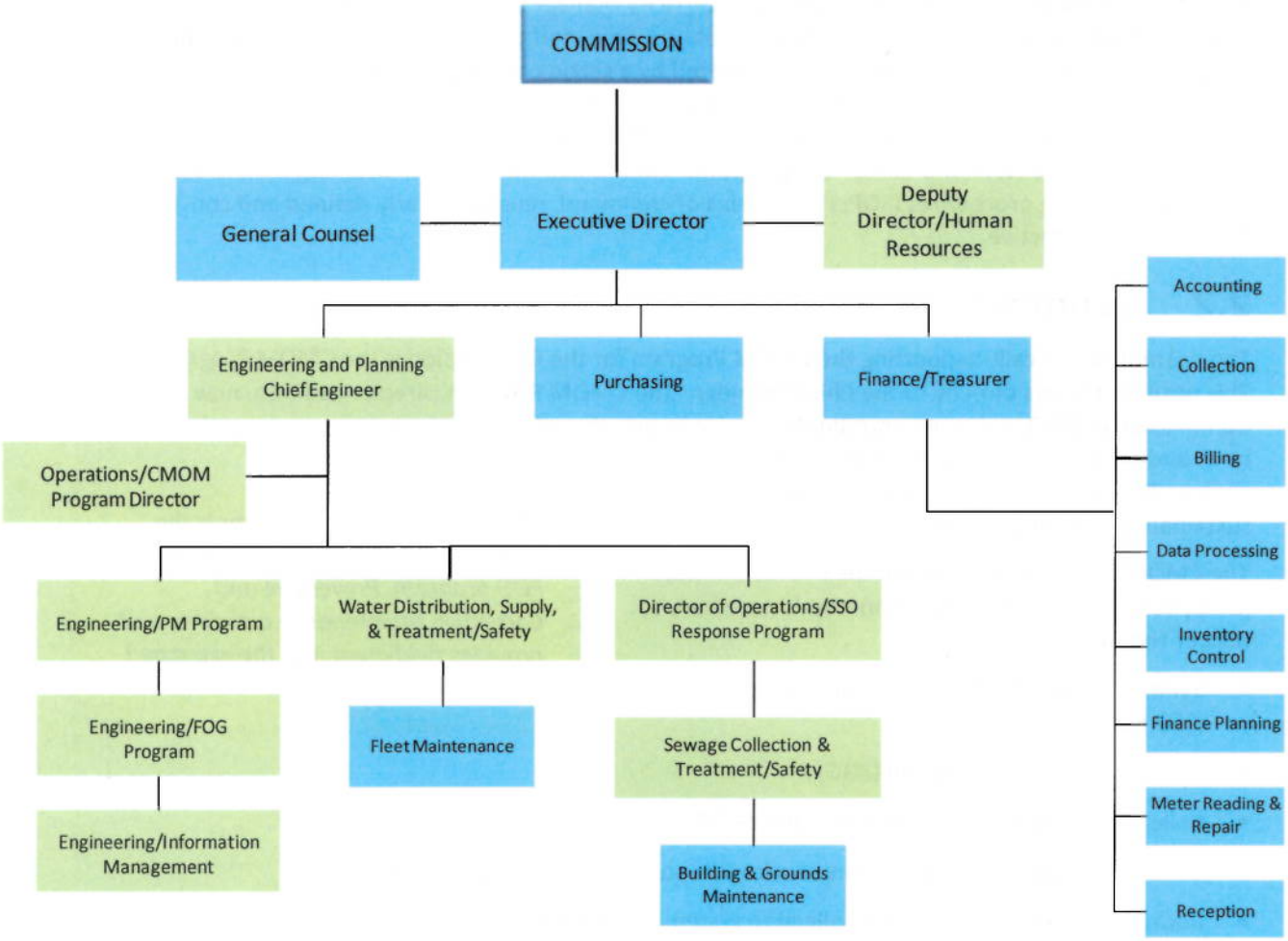
The CMOM Program Director and their team will work jointly to support the means and methods necessary to deliver the following:

- Sanitary Sewer Overflow Emergency Response Plan (SSO ERP)
- Fat, Oil, and Grease Program (FOG)
- Collection system preventive maintenance (PM) of Commission-owned structures
- Collection system corrective maintenance (CM) of Commission-owned structures
- Coordination of recommended collection system routine and capital repair and replacement
- Regulatory reporting in accordance with USEPA and the Massachusetts Department of Environmental Protection (MassDEP) requirements related to CMOM and SSO activities

2.2.1 Organizational Alignment – CMOM

Figure 2-1 shows the Commission's organization, with particular attention to the staffing and departments in place to support the CMOM Program. The green boxes represent the key CMOM positions.

FIGURE 2-1
Overall Commission Organization and Key CMOM Positions



2.2.2 CMOM Job Positions

As the implementation of the CMOM Program progresses, the Commission will continually evaluate the jobs and skills necessary to most effectively accomplish the task of the program. Through this analysis, the Commission will determine which activities can and should be performed by existing Commission staff. This may require updating existing job descriptions and responsibilities to reflect the desired skill sets. Job descriptions and titles will need to be created to reflect the additional CMOM Program duties. As the detailed list of jobs with corresponding descriptions, necessary to carry out the CMOM Program duties are created, they will be included in Appendix C of this report.

To effectively perform the CMOM work, it is recommended the following changes are implemented:

- Director of Management Operations – The existing Director of Management Operations performs the duties related to Human Resources (HR) and will support the CMOM Program as needed.
- Chief Engineer – The responsibilities of the Chief Engineer will be extended to include operations and engineering support for the CMOM Program.

- Operations/CMOM Program Director – Oversees the implementation and maintains the status of the CMOM Program.
- Director of Operations/SSO Response Plan – The responsibilities of the Superintendent will be extended to include the workload activities of the SSO Response Plan Program Manager.
- Engineer/PM Program – The responsibilities of the Engineer III/Engineer II will be extended to include work activities related to the preventive maintenance (PM) Program.
- Engineer – The responsibilities of the Engineer III/Engineer II will be extended to include work activities related to the FOG Program: tracking FOG Program corrective and emergency maintenance. As noted in Section 4, the FOG Program will not be developed until substantial field data is collected and analyzed. The Engineer III/Engineer II will provide a support role in the CMOM Programs, specifically PM and SSO, until the FOG Program is initiated.
- Field Crews – It will be the responsibility of the field crew supervisors to oversee safety.
- Engineering Technician – A new hire or internal candidate to support data management, geographic information system (GIS), and CMMS management.

The job descriptions of the existing roles will need to be modified to clearly define new job requirements and responsibilities. Additional roles may be required beyond these listed to complete program requirements. For example, as previously recommended in the *CMOM Long-Term Preventive Maintenance Plan* (CH2M HILL, 2013b), an engineering technician will be needed to support the engineers and superintendent with GIS and CMMS data management and analysis.

As the CMOM Program proceeds, the job descriptions (to be included in Appendix C, once developed) should be reviewed annually to verify alignment with evolving Commission services and critical functions.

2.2.3 Training and Development

With the initiation of the CMOM Program, new positions and job functions are being created and others are under development. These positions will continue to be modified and or edited for the life of the CMOM Program. The skills necessary to support these roles come from a combination of experienced staff with valuable knowledge of the responsibilities associated with the CMOM activities and newly developed job descriptions which require development and training.

Specific training subjects within the CMOM context include the following, some of which are already developed and have been delivered to Commission staff:

- SSO management:
  - SSO response
  - SSO reporting
  - SSO root cause analysis
- Preventive maintenance (PM):
  - Risk-based work planning
  - Inspection practices (asset specific – manholes, catch basins, siphons, etc.)
- Corrective maintenance (CM):
  - On the job training, with proficiency checks by supervisors
- FOG program:
  - Food service establishment (FSE) inspections
  - Public notification

- Capital planning:
  - Risk-based capital planning
- General training:
  - Mandatory HR training and orientation, using employee handbook, which also lays out Commission goals and history.
  - Mandatory water and wastewater training for field staff by the New England Water Environment Association (NEWEA). Course and testing must be successfully completed within 3 years.
  - Mandatory safety training for all new staff and refresher training for existing staff which includes, but is not limited to, evacuation, fleet operations (safe driving), fork lift operations, confined space entry, and fire and safety. Also included in safety training is where specific safety procedural forms may be found and how to appropriately complete the forms in the field.
  - Cross-connection training.
  - Communications for managers and supervisors.
  - Time management and other "soft skills."
  - Emotional intelligence class (which is under development).
  - Material Safety Data Sheet (MSDS) "right to know."
  - Software training (Office Windows products).
- Construction management:
  - Inspector specialty classes.
  - Drain-layer licensing program by Commission through Engineering Construction Services, for contractors.
  - Construction site inspections.
- Industrial stormwater inspections.

These and other training programs will be developed and delivered through cooperation between the CMOM Program Director, specific program managers, and the Manager of Organizational Diversity or their designates.

2.3 CMOM Program - Annual Objectives

This CMOM Program document is intended to be continuously updated as the CMOM Program evolves. Each activity represented in this document will be reviewed, at a minimum, annually or as circumstances warrant. For example, a significant change to a procedure, staffing or industry standard practice would trigger an edit and release of an updated version of the document. Version control of this document will be the responsibility of the CMOM Program Director. The most current revision date should be recorded on the cover sheet of this report. Assigned managers and directors to key CMOM positions are listed at the front of this document, which may also need periodic updating.

SECTION 3

Sanitary Sewer Overflow Emergency Response Plan

3.1 Objective

A core aspect of a Capacity Management, Operations, and Maintenance (CMOM) Program is establishing a Sanitary Sewer Overflow Emergency Response Plan (SSO ERP) that shows a steady reduction in SSOs and their impacts through improved maintenance, tracking, and proper reporting. Once developed, the Commission's SSO ERP will be included in this program document as Appendix D. SSOs occur in any municipal system despite the best efforts to prevent them simply because of the large number of uncontrollable issues that might influence or cause an SSO.

SSOs present a potential to cause or contribute to environmental and human health impacts (e.g., water quality standards violations, beach closures, etc.) which, in addition to flooded basements and overloaded wastewater treatment plants, are some symptoms of collection systems with inadequate capacity and improper management, operation, and maintenance (USEPA, 2005).

The following are goals of the SSO Program:

- To respond rapidly to calls from the public, police, fire, Commission crews, or others of potential SSO events (sewer backups, water in the streets, pump station overflows).
- To effectively identify SSO events and how to handle them.
- To notify the Massachusetts Department of Environmental Protection (MassDEP) and USEPA Region 1, via email within 24 hours of an SSO event, if an SSO is caused by the Commission's system or by private backups exceeding 100 gallons; or if it entered public ways or areas with the potential for public contact or discharge to the MS4 system.
- To stop an SSO event or promptly perform cleanup, protect public health, and effectively notify the public.
- To perform detailed investigation of the cause of SSO events and actions to prevent recurrence.
- To conduct formal reporting on approved MassDEP and USEPA forms and tracking of SSO information.

3.2 Process Description

The Commission will be developing an SSO ERP, which details the processes, roles, and responsibilities. The SSO ERP will be maintained by the SSO Manager, who is responsible for the annual review and updating of the program, processes, and reporting.

The SSO Emergency Response Plan will contain details on specific procedures and reporting requirements.

The Commission's SSO ERP will include the response and mitigation procedures for sanitary sewer overflows reported by customers or recognized by Commission staff. It will also detail the reporting procedures, standardized root cause analysis procedures and related preventive maintenance (PM) functions.

3.3 Roles and Responsibility

The SSO Manager will be responsible for the delivery and oversight of the Commission's SSO ERP. The position reports to the Chief Engineer, indirectly to CMOM Program Director, and is accountable for the

generation of correspondence and mandated reporting to federal, state, and local agencies. The position also works closely with Operations staff ensuring appropriate response times to SSO events, efficient mitigation of the overflow event, and that complete event information is recorded. If follow-up maintenance work is required, the SSO Manager will be responsible for the supervision and completion of these activities.

Root Cause Failure Analysis (RCFA) will be used to determine the reason for the overflow. The RCFA procedure will include closed-circuit television (CCTV) inspection methods, when deemed necessary, as well as looking at historical information pertaining to the area where the overflow occurred. These efforts will be directed by the SSO Manager and performed by Commission personnel or by contract. Results of the RCFA will be summarized into monthly reports which will present, to the CMOM Program Director, recommended tactical (short-term) and strategic (long-term, including capital projects) solutions to prevent repeat SSOs.

3.4 Reporting

The SSO ERP will detail specific guidelines for the reporting of SSOs. This includes the USEPA, Massachusetts state-required reporting and Commission specific reporting at designated intervals.

Important to the overall success of limiting SSOs, is the analysis of SSO event data. This information will be used to measure the efficiency of the SSO ERP process as well as gauge the performance of the collection system. The number of overflows the collection system is experiencing is a direct representation of system performance.

3.5 Implementation Plan

The Commission is planning for the SSO ERP to be completed by the end of the second quarter of 2014. The specific details of the SSO ERP may be found in the *CMOM Corrective Action Plan* (CH2M HILL, 2013c) (see Appendix B).

SECTION 4

Fats, Oils and Grease Program

4.1 Objective

Fat, oil, and grease (FOG) buildup in sewer lines is a leading cause of sewer blockages. FOG buildup, in conjunction with tree root growth, the accumulation of other sedimentation, and debris and grease deposits, are responsible for creating bottlenecks in the sewer collection system. The blockages may cause or contribute to sanitary sewer overflows (SSOs) in local waterways and/or cause backups in homes and businesses.

4.2 Program Summary

To address the known FOG issue in the collection system, the Commission will work to achieve the following:

- Identifying Commission staff to perform FOG Program activities
- Defining responsibilities of the Commission and Inspectional Services Department (ISD) related to FOG
- Developing standard operating procedures (SOPs) for FOG blockages
- Defining roles and responsibilities of contract labor
- Developing training for Commission staff

The Commission should focus primarily on modifying job descriptions, performing an information technology (IT) gap analysis (to be included as Appendix E of this report), and conducting an analysis of collection system defects before focusing on implementing the FOG Program. The FOG Program will be driven by identified "hot spots" in the Commission's system.

4.3 Implementation Plan

It is recommended that the Commission begin development of a FOG Program document with SOPs by the first quarter of 2016. In addition to SOPs, the FOG Program document should include lines of communication, workflows, responsibilities of Commission staff, and information on data collections, management, and analysis. Once developed, the FOG Program document will be included as Appendix F of this report.

Though the Commission will not be focusing on developing a FOG Program document immediately, it is understood that the Commission will continue responding to FOG events and customer complaints in a timely manner.

SECTION 5

Long-Term Preventive Maintenance Plan

5.1 Objective

The Long-Term Preventive Maintenance Plan (LTPMP) is a guide for routinely and systematically inspecting and maintaining all components of the sanitary and combined collection system including gravity sewer lines, manholes, pump stations, force mains, catch basins, and special structures. By establishing a preventive maintenance (PM) plan, the Commission will move from reactive to proactive sewer maintenance to assist in controlling the potential of sanitary sewer overflows (SSOs) and combined sewer overflows (CSOs) within the Commission's collection system.

5.2 Program Summary

The Commission submitted a *CMOM Long-Term Preventive Maintenance Plan* (CH2M HILL, 2013b) (see Appendix A), as a requirement of the USEPA's Administrative Order on Consent (AOC).

The LTPMP report encompasses procedures for Commission's routine maintenance activities with focus on sustaining the wastewater collection system's hydraulic capacity for conveying wastewater.

The following are goals of the LTPMP:

- To protect the large investment in collection system assets by maintaining adequate capacities and extending useful life.
- To prioritize budgets related to collection system maintenance, capital repair and replacement.
- To maintain wastewater collection system to render its full capacity to convey flows.
- To procure and implement necessary management information systems (MISs) to support geographic information system (GIS) mapping, operations, and maintenance management.
- To perform all operations in a safe manner to avoid personal injury and property damage.
- To minimize SSO and CSO occurrences and prevent unnecessary damage to public and private property and public health hazards.
- To educate the public regarding the identification and reporting of SSOs and CSOs.

Additional details related to the PM plan can be found in the *CMOM Long-Term Preventive Maintenance Plan* (CH2M HILL, 2013b).

5.3 Implementation Schedule

Pursuant to the AOC, the implementation of the LTPMP began on September 19, 2013. The first progress report will be submitted on January 31, 2014.

SECTION 6

Corrective Maintenance

6.1 Objective

The corrective maintenance (CM) process is centered in the Operations division. The goal for the Commission is to reduce reactive maintenance through predictive and preventive maintenance (PdM/PM) strategies. However, some collection system failures are inevitable, and the objective of the PdM and PM programs are to minimize, not eliminate, the number of unexpected or emergency maintenance events. The Commission classifies corrective maintenance into three categories, as shown Table 6-1.

TABLE 6-1
Corrective Maintenance Categories

Corrective Maintenance Types	Maintenance Type Description	Priority
Scheduled Maintenance	Maintenance activities recognized through PM and PdM programs, field work observation or customer observation that are non-emergency and can be scheduled for completion at a later date without impacting public health, service delivery, or permit non-compliance	3
Unscheduled Maintenance	Maintenance activities recognized through PM and PdM programs, field work observation or customer observations. These activities are non-emergency, pose a potential threat to either public health, service delivery or permit compliance and should be scheduled within a specific time window (one to five days)	2
Emergency Response	A unique event posing an immediate threat to public health, service delivery or permit non-compliance requiring immediate action	1

Workflow processes should be common across all three of these maintenance categories, whether the work is performed by the Commission or a contractor, especially in terms of data collection, root cause investigations, and reporting.

6.2 "Scheduled" Corrective Maintenance

6.2.1 Objective

"Scheduled" maintenance activities are the result of a proactively managed maintenance department. These may include a planned replacement of assets based on life cycle or inspection data, and are typically done ahead of the failure of the asset. The percentage of "Scheduled" or planned maintenance is a direct measurement of the performance of the preventive maintenance (PM) program. Crucial to the success of a "Scheduled" maintenance program is strict adherence to standard operating procedures (SOPs) and workflows that coincide with the maintenance activities being performed.

6.2.2 Process Description

"Scheduled" maintenance activities will develop from three areas within the commission: the preventive and predictive maintenance (PM/PdM) programs, Commission/Contactor field observations, and customer complaints/observations.

As defects to Commission-owned structures (assets) are recognized through PM/PdM inspection, they will be summarized into monthly reports. Collection system structure types owned by the Commission will be reported individually and managed by the Engineering/PM Program Manager and the Capacity Management, Operations, and Maintenance (CMOM) Director. It will be their responsibility to determine the short-term maintenance needs of the structure. Long-term solutions requiring engineering study and construction will be referred to the Chief Engineer for capital planning.

Structures requiring Priority 3 maintenance, as described in Table 6-1, will be referred to the Operations department for planning and scheduling. Paper work orders will continue to be used until the Commission implements a computerized maintenance management system (CMMS). However, in advance of the CMMS implementation, SOPs for work order completion are to be developed. The Foreman will approve the work request and distribute to the field crew for completion according to the estimated completion schedule.

6.2.3 Roles and Responsibilities

The Operations department is responsible for planning and executing all scheduled corrective maintenance (CM), whether done by in-house crews or through contractors. The work order is completed by Operations.

The Engineering/PM Manager and CMOM Director are responsible for looking at the frequency, type, and location of CM needs in the system.

6.2.4 Reporting and Analysis

"Scheduled," "Unscheduled," and "Emergency" maintenance are work order types that require individual tracking. CM metrics are necessary to measure the efficiency of the maintenance department as well as gauge the performance of the collection system. CM summaries will be analyzed, similar to PM reporting, to determine maintenance operating budgets and capital repair and replacement budgets.

"Scheduled" CM is tracked for the following:

- Failure type by structure
- Maintenance activity by structure type
- Maintenance performed within scheduled time
- Common failure type by structure
- CM versus PM by structure type

6.3 "Unscheduled" Corrective Maintenance

6.3.1 Objective

"Unscheduled" corrective maintenance (CM) has two forms: maintenance work that is recognized through preventive and predictive maintenance (PM/PdM), which needs to be corrected in an immediate time frame (1 to 5 days); and call-outs received from customers, which also require immediate response. Examples may include asset failures, such as clogged catch basins, which are generally straightforward to remedy.

6.3.2 Process Description

CM events that are recognized by Commission Operations staff through field operations will be relayed to the Operations/Engineering department. It is the responsibility of the department (field) supervisor to determine the extent of the corrective action and whether or not the repair is immediate or can be scheduled. For corrective actions that can be performed immediately by the crew onsite, a paper work order will be completed detailing the corrective action performed. This work order will be returned to the field supervisor after the work is completed for approval and submission to the yard clerk. If the work is not able to be immediately addressed but is routine, non-emergency, and able to be scheduled at a later date, then the field supervisor will notify Operations to initiate a work order for planning and scheduling.

CM events triggered by customer notification will be initiated as work requests by dispatch and will be immediately dispatched directly to the field crew. Conditions upon arrival will be relayed to the field supervisor for work approval or for the receipt of further instruction.

6.3.3 Roles and Responsibilities

The Operations department is responsible for planning and executing all "Unscheduled" CM, whether done by in-house crews or through contractors. The work order is completed by Operations.

The Engineering/PM Manager and CMOM Director are responsible for looking at the frequency, type, and location of CM needs in the system.

6.3.4 Reporting and Analysis

"Scheduled," "Unscheduled," and "Emergency" maintenance are work order types that require individual tracking. CM metrics are necessary to measure the efficiency of the maintenance department as well as gauge the performance of the collection system. CM summaries will be analyzed, similar to PM reporting, to determine maintenance operating budgets and capital repair and replacement budgets.

"Unscheduled" maintenance is tracked for: failure type by structure, maintenance activity performed by structure, and percent CM performed within scheduled time.

In the case of "Unscheduled" and "Emergency" maintenance situations, more thorough analysis is usually needed to understand the root cause of the failure. In theory, a solid preventive/predictive maintenance (PM/PdM) program, coupled with "Scheduled" CM and capital planning, should minimize unexpected asset failures, so it is important to understand why such an event occurs.

6.4 "Emergency" Maintenance

6.4.1 Objective

"Emergency" maintenance is the result of an event posing an immediate threat to public health, service delivery, or permit non-compliance requiring immediate action. "Emergency" maintenance response is immediate either by Commission staff or its Contractors. Common examples of "Emergency" maintenance are structural failures resulting in pipe failures, pipe blockages resulting in service disruptions and sewer overflows, weather-induced capacity issues (flooding), and electrical and mechanical failures.

6.4.2 Process Description

When an emergency situation occurs in the collection system, corrective actions to mitigate the issue will occur without delay. A field supervisor will be immediately notified who, when on scene, will promptly initiate levels of action based on the severity of the conditions found. In the event of a sanitary sewer overflow (SSO), the SSO Manager will be notified immediately. For all other emergency conditions, the appropriate persons responsible will be notified, including but not limited to: CMOM Program Director; SSO Manager; Fat, Oil, and Grease (FOG) Manager; and Operations Manager.

6.4.3 Roles and Responsibilities

Roles and responsibilities pertaining to emergency response vary according to the nature and severity of the emergency.

Emergency response plans should be reviewed and practiced regularly to ensure that compliance and understanding. Edits and revisions should be made.

The Engineering/PM Manager and CMOM Director are responsible for looking at the frequency, type, and location of corrective maintenance (CM) needs in the system.

6.4.4 Reporting and Analysis

"Scheduled," "Unscheduled" and "Emergency" maintenance are work order types that require individual tracking. CM metrics are necessary to measure the efficiency of the maintenance department as well as gauge the performance of the collection system. CM summaries will be analyzed, similar to PM reporting, to determine maintenance operating budgets and capital repair and replacement budgets.

Emergency work tracking includes: percent emergency work versus maintenance work (combined PM and CM).

In the case of "Unscheduled" and "Emergency" maintenance situations, more thorough analysis is usually needed to understand the root cause of the failure. In theory, a solid preventive/predictive maintenance (PM/PdM) program, coupled with "Scheduled" CM and capital planning, should minimize unexpected asset failures, so it is important to understand why such an event occurs.

SECTION 7

Capital Planning

7.1 Objective

The capital planning process for the Capacity Management, Operations, and Maintenance (CMOM) program is developed through the analysis of the preventive, predictive, and corrective maintenance (PM/PdM/CM) program summaries. Key roles with input into the capital planning process are the Sanitary Sewer Overflow (SSO) Manager; Fat, Oil, and Grease (FOG) Manager; and Engineering/PM Manager. These positions will report monthly, quarterly, and annually to the CMOM Program Director, who is responsible for assembling capital recommendations and reporting up to the Chief Engineer.

7.2 Process Description

Routine field work will be performed as identified in the *CMOM Long-Term Preventive Maintenance Plan* (CH2M HILL, 2013b). As field data is collected, deficiencies in the Commission's existing system will be identified. The Engineering and Planning department will meet with the CMOM Director and the Finance department to discuss recommended Capital Improvement Program (CIP) projects. The parties should discuss and agree upon priorities and impacts of each project prior to submitting the final CIP budget. The Engineering and Planning department will develop a list of proposed improvements to be made to the Commission's system. The list should be prioritized based on a number of factors, including but not limited to: size of the improvement project, time it will take to complete, capital cost, impact of failure/potential failure, etc.

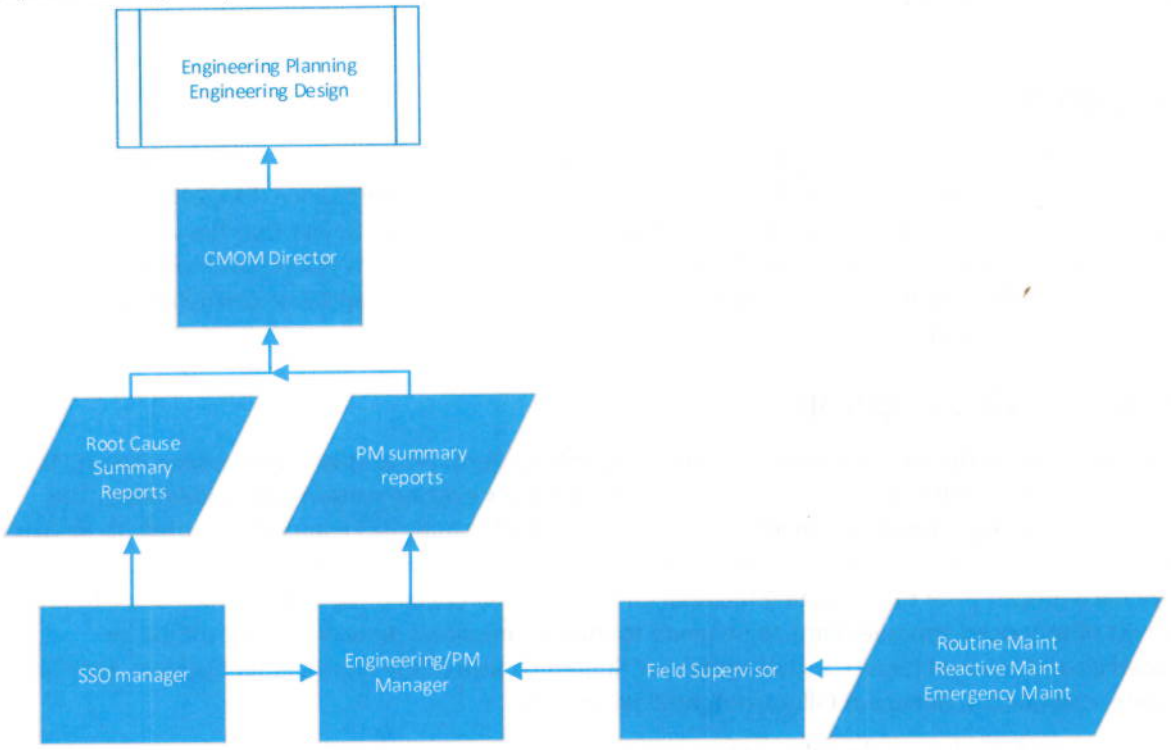
CIP projects may be prioritized using the following strategy:

- Priority 1: This priority is assigned to the most critical projects, which would fit into any of the following descriptions:
  - required by a statutory or regulatory requirement, court order or consent decree
  - necessary to correct an immediate threat to public health and safety
  - necessary to correct an immediate threat to worker health and safety
  - necessary to prevent imminent failure of the water or wastewater systems
- Priority 2: This category includes projects that are essential to maintain current service levels, which protect the environment, or that directly reduce costs and/or increase revenues. Projects that are included in this category must meet one or more of the following criteria:
  - necessary for environmental protection
  - part of the Wastewater Facilities Plan, Water Distribution Plan, Water Conservation Plan, or other similar Commission-endorsed improvement plan
  - corrects a chronic water discoloration problem
  - directly results in a net decrease in Commission operating and/or capital costs
- Priority 3: The projects in this category are necessary to provide improved service that ensures proper long-term operation of the distribution and collection system.

7.3 Roles and Responsibilities

Coordination of maintenance and Capital Improvement Programs (CIPs) across the Commission is the responsibility of the CMOM Program Director, as illustrated in Figure 6-1.

FIGURE 7-1
Capital Planning Rollup



7.4 Analysis and Reporting

Capital planning is managed through a balance of risk priorities and financial limitations. The highest risk needs are generally handled first, with lesser risk items handled in sequence as the budget allows. Many valuable projects will be deferred as a result of this process, but should not be lost. It is also recommended that managers conduct Business Case Evaluations to weigh the relative benefits and costs between competing capital programs, especially forward-looking upgrades. This is the industry standard practice of evaluating each capital program on a common assessment platform (i.e., the same financial basis) and also looking at non-monetary impacts that are not as simple to quantify in terms of costs (such as noise, odors, traffic, etc). Using this approach makes the selection of individual programs easier to defend, and promotes a rigorous and fair process among competing plans.

SECTION 8

References

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